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Risk Reduction and Environmental Stewardship—Remediation Services

Standard Operating Procedure

for

Single-Stage Sampling for Surface Water Runoff

Revision Log

Revision No.	Effective Date	Prepared By	Description of Changes	Affected Pages
0	9/17/93	R. Conrad	New SOP	All
1	12/31/01	Steve Veenis	Updated information and cited new references of information.	All
2	03/30/04	Steve Veenis	“Minor” changes, e.g., new format, updated references, & new organizational updates.	All

Single-Stage Sampling for Surface Water Runnoff

Table of Contents

List of Acronyms and Abbreviations

ELS	environmental liquid sampler
FTL	field team leader
LANL	Los Alamos National Laboratory
MET	Meteorological Tower
PPE	personal protective equipment
PTL	project team leader
QII	quality integration and improvement
QP	quality procedure
QPPL	quality program project leader
RPF	records processing facility
RRES-RS	risk reduction and environmental stewardship—remediation services
SOP	standard operating procedure

SSHASP site-specific health and safety plan

Single-Stage Sampling for Surface Water Runnoff

1.0 PURPOSE

This standard operating procedure (SOP) states the responsibilities and describes the process for collecting descrete samples of surface water runoff from hillsides or small ephemeral drainages. The success of this process directly ties to the participation of each employee within the Los Alamos National Laboratory (LANL), Risk Reduction and Environmental Stewardship, Remediation Services (RRES-RS) project.

2.0 SCOPE

2.1 All **RRES-RS project participants** shall implement this mandatory SOP.

2.2 **Subcontractors** performing work under the RRES-RS project's quality program shall follow this SOP when collecting descrete samples of surface water runoff from hillsides or small ephemeral drainages.

OR

2.3 **Subcontractors** may use the subcontractor's procedure as long as the substitute meets the requirements prescribed by the RRES-RS Quality Management Plan, and the RRES-RS quality program project leader (QPPL) and a RRES-RS technical staff person approve the procedure before the subcontractor begins the designated activity.

3.0 TRAINING

3.1 **RRES-RS project participants** shall train to and use the current version of this SOP; contact the author if the SOP text is unclear.

3.2 **RRES-RS project participants** using this SOP shall document training in accordance with QP-2.2.

3.3 The responsible **project team leader (PTL)** shall monitor the proper implementation of this procedure and ensure that the appropriate personnel complete all applicable training assignments.

3.4 **RRES-RS project participants** may request any needed assistance with implementation of this procedure from RRES-RS Quality Integration and Improvement (QII).

4.0 DEFINITIONS

4.1 *Single-stage sampler type 1 (siphon samplers)*—A siphon sampler is a device with a bent tube with one limb longer than the other, which draws off a liquid to a lower level. These samplers automatically collect a sample when the water level of a stream passes a specified elevation.

4.2 *Single-stage sampler type 2 (environmental liquid sampler [ELS])*—An ELS is a mechanically-operated instrument that collects a "first flush" volume of liquid without a power source. Personnel may use the patented instrument in a remote setting with minimal personnel involvement.

4.3 *Site-specific health and safety plan (SSHASP)*—Health and safety plan approved by an RRES-RS health and safety representative that is specific to a site or RRES-RS-related field activity. This document contains information specific to the project, including scope of work, relevant history, descriptions of hazards by activity associated with the project site(s), and techniques for exposure mitigation (e.g., personal protective equipment [PPE]) and hazard mitigation.

5.0 RESPONSIBLE PERSONNEL

The following personnel are responsible for activities identified in this procedure:

- Field team leader
- Field team member
- PTL
- QPPL
- RRES-RS project participants
- User

6.0 BACKGROUND AND PRECAUTIONS

6.1 **RRES-RS project participants** shall use this SOP in conjunction with an approved SSHASP.

6.2 The **field team leader** (**FTL)** shall ensure the appropriate consideration of Integrated Safeguards & Security Management (ISSM) issues and the completion of Integrated Work Documents (IWDs) with appropriate signatures prior to the installation of single-stage samplers.

6.3 The U.S. Geological Survey developed single-stage samplers as a simple method to obtain automatically suspended sediment and surface water, runoff samples without immediate attention. When the water surface rises to a selected stage, the samplers collect water stage.

6.4 These devices are useful tools when deployed during a preliminary site characterization. They are deployed inexpensively and in great numbers to determine if certain constituents are present and to a limited extent, the concentrations of the constituents.

6.5 If used properly, single-stage samplers are valuable screening and/or assessment tools. Data obtained from use, however, requires interpretation with a clear understanding of the limitations associated with these tools (i.e., no time stamp, maintenance variability, and reproducable results).

7.0 EQUIPMENT

Listed below are descriptions of commonly used pieces of equipment, including advantages and limitations.

7.1 *Glass or plastic bottles*—use either type depending on manufacturer's recommendation and analytical requirements.

7.2 *Tubing* (applicable to siphon-type sampler)—made of different types of material dependent on analyzed constituents.

7.3 *Miscellaneous parts*—as needed contingent on the type of single-stage sampler adopted by the user or recommended by the manufacturer.

8.0 PROCEDURE

Make any deviations from this SOP in accordance with QP-5.7 and/or SOP-01.01.

8.1 Read Background

8.1.1 Design and Operation

The design of the siphon sampler is similar to that described by Guy and Norman, 1979, and shown in Attachment A. The operation of a siphon sampler during an event with increased stage and flow is simple. As the stream stage rises to the elevation of the intake level A (reference Attachment A), water enters the 1/2-inch-diameter plastic tube. As the stream continues to rise, water continues to move up the intake tube until a siphon is created and the sample bottle starts to fill. The sample bottle fills rapidly because the hydraulic head drives the flow rate, which is approximately the height difference between the stream stage and the discharge end of the intake tube.

8.1.2 Type 2 Environmental Liquid Sampler (ELS)

The ELS is a patented system manufactured by D-Tec Corp. The unit consists of a screened-sampling head which contains a float

designed to extend into the sampling bottle (typically a two-liter plastic bottle). The sampling bottle screws onto the sampling head. A stainless steel bracket supports the sampling unit when it is buried in the ground. When installed the unit collects stormwater flowing down an erosion channel as it passes through the screened sampling head. When the collected sample reaches the float suspended in the collection bottle, it triggers an orifice in the sampling head to seal and preserve the sample integrity.

8.2 Install Sampler

8.2.1 The **field team member** shall install the sing-stage sampler so that surface water flows into the prepared bottle or container.

Note: Installation may involve digging a hole in which to place the sampler and/or bottle, placing a bottle at the end of a weir or any other technique that allows the bottle to fill with surface water runoff.

8.2.2 In the design that utilizes emplacing the bottle in a hole, the **field team member** shall build or dam up (stage) the area upstream from the bottle so that water collects or ponds around the inlet tube of the bottle.

8.2.3 The **field team member** shall locate the bottle and inlet tube in this design below the surface of any ponded water so that gravity enables flow via the tube into the bottle.

8.2.4 If using the ELS, the **field team member** shall place the sampler into an excavated hole 12 inches deep by 10 inches wide, however, it is not necessary in most cases, to create an artificial ponding upstream of the sampler.

8.2.5 The **field team member** shall place the sampler in a defined drainage area, buried with the sampling head exposed above ground and as flush to the ground surface as possible

8.3 Collect Sample

8.3.1 As soon as possible after a storm event, the **field team member** shall check the sample bottles for water.

8.3.2 If the bottles contain water, the **field team member** shall immediately remove, cap, and place bottles in a cooler if desired constituents require preservation at low temperatures.

8.3.3 The **field team member** shall record the probable date of the storm event that led to the sample collection.

Note: Data from the nearest Meteorological Tower (MET) station are helpful in obtaining this information.

8.3.4 If appropriate the **field team member** shall install several samplers at different levels at each site to collect samples throughout the anticipated range in water levels (see Attachment A).

Note: Installation of ELS samplers at different levels within a sampling location is possible if the soil depth is deep enough to install the sampler.

8.4 Preserve Sample

Sample preservation (e.g., filtration, acidification) depends on the information desired by the user.

8.4.1 The **user** shall refer to SOP-01.02, Sample Container and Preservation.

8.4.2 At a minimum, the **user** shall determine specific conductance and pH as soon as possible.

9.0 LESSONS LEARNED

9.1 Before performing work described in this SOP, **RRES-RS project participants** should go to the Department of Energy Lessons Learned Information Services home page, located at http://www.tis.eh.doe.gov/ll/ll.html, and/or to the LANL Lessons Learned Resources web page, located at http://www.lanl.gov/projects/lessons_learned/, and search for applicable lessons.

9.2 During work performance and/or after the completion of work activities, **RRES-RS project participants**, as appropriate, shall identify, document, and submit lessons learned in accordance with the LANL, Lessons Learned System located at http://www.lanl.gov/projects/lessons_learned/.

10.0 RECORDS

The **PTL** shall submit the following records to the Records Processing Facility (RPF) in accordance with QP-4.4:

- Data collection records
- Analytical results

11.0 REFERENCES

To implement properly this SOP, **RRES-RS project participants** should become familiar with the contents of the following documents located at http://erinternal.lanl.gov/home_links/Library_proc.shtml:

- RRES-RS, Quality Management Plan
- QP-2.2, Personnel Orientation and Training
- QP-4.4, Record Transmittal to the Records Processing Facility
- QP-5.7, Notebook Documentation for Environmental Restoration Technical Activities
- SOP-01.01, General Instructions for Field Investigations
- SOP-01.02, Sample Container and Preservation
- SOP-01.03, Handling, Packaging, and Shipping of Samples
- SOP-01.04, Sample Control and Field Documentation
- Edwards, T.K. and Glysson, G. D., 1988, Field Methods for Measurement of Fluvial Sediment: U.S. Geological Survey Open-File Report 86-531, 118 p.
- Guy and Norman, 1979. Techniques of Water Resource Investigations, Field Methods for Measurments of Fluvial Sediment. U.S.Geological Survey Book 3, Chapter 2
- D-Tec Corp., 2003. Storm Water Sampler Manual, 12 p.
- Inter-Agency Committee on Water Resources, Subcommittee on Sedimentation, 1961, The Single-Stage Sampler for Suspended-Sediment: Minneapolis, Minnesota, St. Anthony Falls Hydraulics Laboratory, Report 13, 105 p.

12.0 ATTACHMENTS

The **user** of this SOP may locate all forms associated with this procedure at http://erinternal.lanl.gov/Quality/ user/forms.asp.

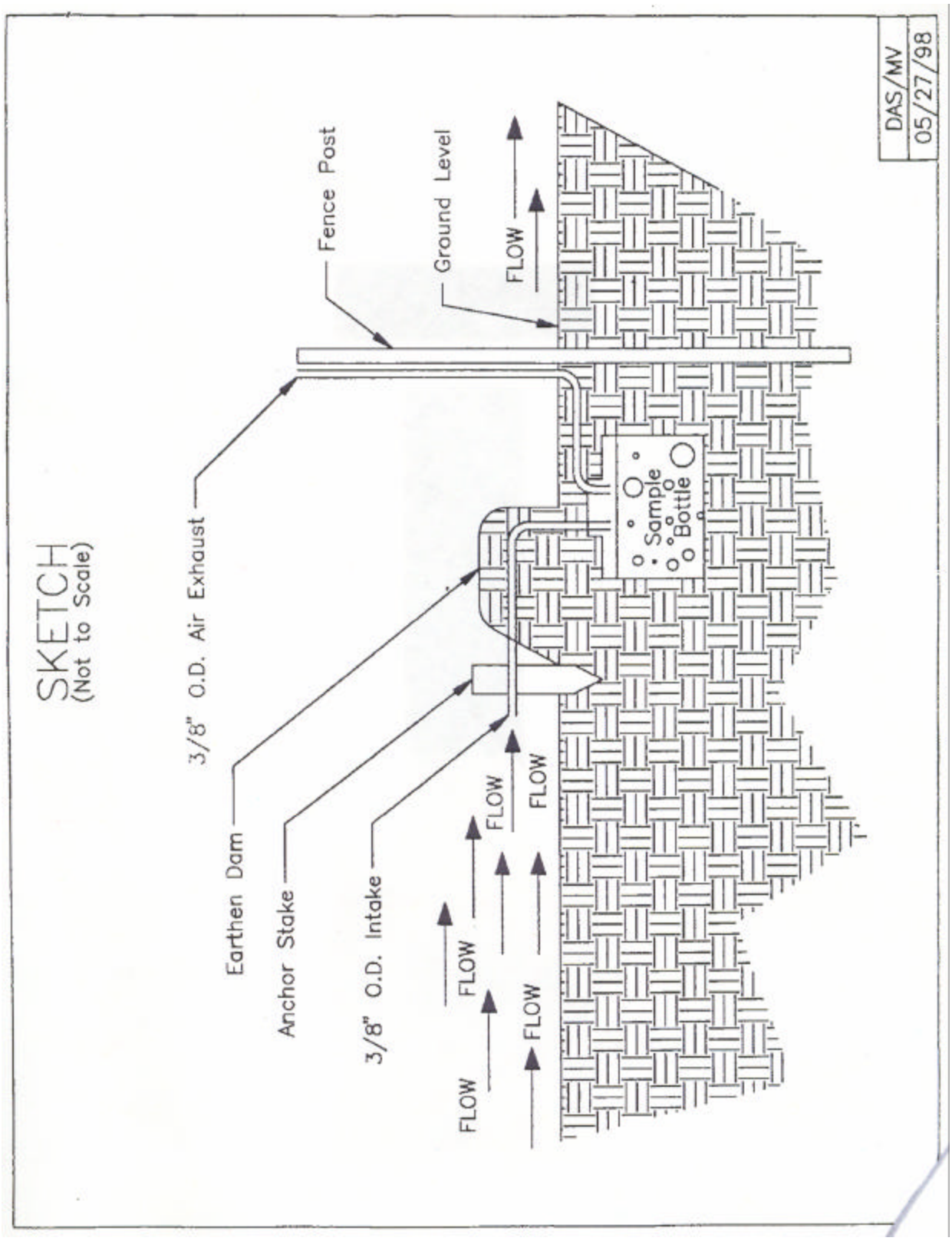
Attachment A: Siphon-Type Sampler (1 page)

Attachment B: Environmental Liquid Sampler (ELS) 1 page

Using a token card, click here to record "self-study" training to this procedure.

If you do not possess a token card or encounter problems, contact the RRES-ECR training specialist.

Attachment A: Siphon-Type Sampler



Attachment B: Environmental Liquid Sampler (ELS)

Top View

Bottom View

Assembling

Assembled